Classroom Practices of High School Math Teachers: A Longitudinal Analysis

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Effective instruction critical for promoting students’ conceptual understanding

Standards-based teaching distributed inequitably across school contexts

• Teachers in schools that mainly serve low-income or minority students more often relying on rote instructional methods
### Key Features of High-Quality PD

<table>
<thead>
<tr>
<th>Content and pedagogical content focus</th>
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<tr>
<td>Active learning experience</td>
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<tr>
<td>Connections to teacher work</td>
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<tr>
<td>Program duration</td>
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**Introduction**

**Program Description**

**Data Collection**

**Results**

**Discussion**
Limited research on the sustainability of the effects of PD

Most studies based on teachers’ self-reported data

Limited focus on changes in various aspects of mathematics instruction
Funded by the NSF MSP program-Grant no: 0412072

Partnership between Rice University and two urban school districts that mainly serve low-income students or students of color

Designed to provide PD, support, and leadership experiences for high school teachers

79 teachers in 3 cohorts
**Program Details**

**Summer institutes**
- 4-week long for two consecutive summers
- Mathematics focus: algebra and geometry during the 1st summer & combinatorics and statistics during the 2nd summer

**Academic year activities**
- Monthly meetings
- Individualized support through site visits and electronic communication
49 high-school mathematics teachers from Cohorts I & II

All teachers certified

36 held master’s degrees

Years of experience ranged from 1 to 49 years (mean = 14.1; median = 12)
Students used a variety of means to represent concepts (e.g., models, drawings, graphs, manipulatives).

Students discussed and explained their understandings of each question with a partner or within a small group. Teacher used probing questions to deepen students' mathematical understanding. Teacher provided explicit expectations for group activity and product(s). Students were actively engaged in thought-provoking activities that often involved the critical assessment of procedures. Teacher's questions triggered divergent modes of thinking among students.

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<thead>
<tr>
<th>Scale</th>
<th>Reliability Estimate</th>
<th># of Items</th>
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<tbody>
<tr>
<td>Student Interactions</td>
<td>.87</td>
<td>5</td>
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<tr>
<td>Mathematical Discourse</td>
<td>.75</td>
<td>4</td>
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<td>Instructional Clarity</td>
<td>.81</td>
<td>3</td>
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<tr>
<td>Mathematical Habit of Mind</td>
<td>.79</td>
<td>6</td>
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<td>Hands-on Materials</td>
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**Results**

-0.10  0.10  0.30  0.50  0.70  0.90  1.10  1.30

**Effect Size**

<table>
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<tr>
<th>Time (semester in the program)</th>
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<th>1</th>
<th>2</th>
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<th>5</th>
<th>6</th>
<th>7</th>
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**Introduction**

**Program Description**

**Data Collection**

**Results**

**Discussion**
Results Cont.

-0.50
-0.30
-0.10
0.10
0.30
0.50
0.70
0.90
0
1
2
3
4
5
6
7

Effect Size

Time (semester in the program)

Mathematical Habit of Mind
Hands-on Materials Experienced
Hands-on Materials New
Discussion

- Mathematical Discourse
  - Convenient sample

- Mathematical Habit of Mind

- Instructional Clarity

- Student Interactions

- Hands-on Materials

Limitations

- Number of observations
Thanks!

Questions?